

CLAIMS

WHAT IS CLAIMED IS:

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1. A method for transmitting upstream data from a cable modem within a cable television plant, the method comprising:

transmitting a first portion of the upstream data on a first upstream channel from the cable modem; and

transmitting a second portion of the upstream data on a second upstream channel from the cable modem, the second upstream channel differing from the first upstream channel.

2. A method as recited in claim 1, further comprising:

obtaining the first upstream channel from information in a downstream channel input to the cable modem; and

obtaining the second upstream channel from the information in the downstream channel input to the cable modem.

3. A method as recited in claim 2, wherein the the information comprises one or more upstream channel descriptors (UCDs) and obtaining the first upstream channel comprises collecting the one or more UCDs from the downstream channel, and selecting a first one of the collected UCD(s), wherein the first upstream channel is based on the first selected UCD.

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4. A methods as recited in claim 3, wherein the second upstream channel is obtained by selecting a second one of the collected UCD(s), wherein the second upstream channel is based on the second selected UCD.

5. A method as recited in claim 4, wherein selecting the first and second UCD's is based on a random algorithm.

6. A method as recited in claim 4, further comprising verifying whether the second upstream channel is still valid.

7. A method as recited in claim 1, wherein transmitting data over the first upstream channel is alternated with transmitting data over the second upstream channel.

8. A method as recited in claim 1, wherein a first type of data are transmitted over the first upstream channel, and a second type of data are transmitted over the second upstream channel.

9. A method as recited in claim 1, wherein data are transmitted over the first upstream channel when it is less congested than the second upstream channel, and data are transmitted over the second upstream channel when it is less congested than the first upstream channel

10. A method as recited in claim 1, wherein data are primarily transmitted over the first upstream channel, and data are transmitted over the second upstream channel to facilitate load balancing.

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11. A cable modem comprising:

a processor configured to initiate transmission on multiple upstream channels;

and

an upstream transmitting component operating in conjunction with the processor and configurable by the processor to transmit data over multiple upstream channels.

12. A cable modem as recited in claim 11, wherein the upstream transmitting component includes a first transmitter that is capable of being configured by the processor to transmit data at both a first upstream channel and a second transmitter that is capable of being configured by the processor to transmit at a second upstream channel that differs from the first upstream channel if the second upstream channel is available.

13. A cable modem as recited in claim 12, further comprising:

a first media access controller (MAC) coupled with the first transmitter and the processor, the first MAC arranged to receive data from the processor for outputting to the first transmitter so that the first transmitter outputs the data over the first upstream channel; and

a second MAC coupled with the second transmitter and the processor, the second MAC arranged to receive data from the processor for outputting to the second transmitter so that the second transmitter outputs the data over the second upstream channel.

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14. A cable modem as recited in claim 12, further comprising a combiner receiving data transmitted over the first and second upstream channels from the first and second transmitters, the combiner multiplexing the first and second upstream channels so that the received data are output on a single line.

15. A cable modem as recited in claim 13, wherein the first MAC is integrated within a first integrated MAC and PHY device, and the second MAC is integrated within a second integrated MAC and PHY device,.

16. A cable modem as recited in claim 13, wherein the first MAC is coupled with a first packet memory, and the second MAC is coupled with a second packet memory, the first and second MAC being arranged to transmit data that is written to its corresponding packet memory.

17. A cable modem as recited in claim 16, wherein the first and second packet memory are located within a DRAM device.

18. A cable modem as recited in claim 12, further comprising:

a MAC coupled with the first transmitter block, the second transmitter, and the processor, the MAC being arranged to receive data from the processor for outputting to the first transmitter and/or the second transmitter so that the first transmitter and/or second transmitter outputs the data over the first upstream channel and/or second upstream channel.

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19. A head end for receiving upstream data from a cable modem, comprising a splitter that receives an upstream signal from the cable modem, the upstream signal including a first portion of the upstream data on a first upstream channel and a second portion of the upstream data on a second upstream channel that differs from the first upstream channel, the splitter being arranged to separate the first portion of the upstream data transmitted over the first upstream channel from the second portion of the upstream data transmitted over the second upstream channel for further processing of the separated data.

20. A method of transmitting upstream data from a cable modem over multiple upstream channels within a cable television plant, the method comprising:

configuring the cable modem to transmit over a first upstream channel if the first upstream channel is represented by information within a downstream channel; and

configuring the cable modem to transmit over a second upstream channel if the second upstream channel is represented by information within the downstream channel and if the second upstream channel differs from the first upstream channel.

21. A method as recited in claim 20, further comprising:

determining whether the cable modem is authorized to transmit over multiple upstream channels prior to obtaining a second upstream channel; and

configuring the cable modem with the second upstream channel only where the cable modem is authorized to transmit over multiple upstream channels.

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22. A method as recited in claim 20, further comprising:
transmitting over a single channel if the cable modem is set up only to
transmit over the first upstream channel; and
transmitting over both the first and second upstream channels if the cable
modem is set up to transmit over both the first and second upstream channels.

23. A method as recited in claim 22, wherein transmitting over both the
first and second upstream channels includes alternatively selecting the first and
second upstream channels for transmission of one or more packets of data.

24. A method as recited in claim 22, wherein transmitting over both the
first and second upstream channels includes selecting either the first or second
upstream channels for transmission of a particular type of data.

25. A method as recited in claim 22, wherein transmitting over both the
first and second upstream channels includes selecting either the first or second
upstream channels for transmission of data based on which upstream channel is least
congested.

26. A method as recited in claim 22, wherein transmitting over both the
first and second upstream channels includes selecting the first upstream channel for
primary data transmission and selecting the second upstream channel for load
balancing.

27. A method as recited in claim 20, further comprising powering up the cable modem, wherein the setting up of the cable modem with the first upstream channel is initiated by the powering up.

28. A method as recited in claim 20, wherein the setting up the cable modem with the second upstream channel is initiated when the cable modem has previously been set up for transmitting over only a single upstream channel.

29. A method as recited in claim 20, wherein the setting up of the cable modem with the second upstream channel is initiated when the cable modem has previously been set up for transmitting over only a single upstream channel.

30. A method as recited in claim 20, further comprising:
prior to setting up the cable modem to transmit over the second upstream channel, requesting initial ranging using the first upstream channel;

if a transmission power level of the cable modem is not greater than a maximum transmission power level, adjusting the transmission power level of the cable modem when the head end fails to respond to the initial ranging request using the first upstream channel; and

if the transmission power level is greater than the maximum transmission power level, setting up the cable modem with a next first upstream channel; and

performing periodic ranging between the head end and the cable modem using the first upstream channel when the head end responds to the initial ranging request using the first upstream channel.

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31. A method as recited in claim 30, wherein the transmission power level is adjusted in increments from a minimum value to a maximum power level.

32. A method as recited in claim 30, wherein a value of the first upstream channel is altered by the periodic ranging and the cable modem is set up to transmit over the second upstream channel that differs from the altered first upstream channel value.

33. A method as recited in claim 30, further comprising:

after setting up the cable modem to transmit over the second upstream channel, requesting initial ranging using the second upstream channel;

if a transmission power level of the cable modem is not greater than the maximum transmission power level, adjusting the transmission power level of the cable modem when the head end fails to respond to the initial ranging request using the second upstream channel;

if the transmission power level is greater than the maximum transmission power level, setting up the cable modem with a next second upstream channel if available; and

performing periodic ranging between the head end and the cable modem using the second upstream channel when the head end responds to the initial ranging request using the second upstream channel.

34. A method as recited in claim 33, wherein a value of the first upstream channel is altered by the periodic ranging and the cable modem is set up to transmit

over the second upstream channel that differs from the altered first upstream channel value.

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35. A cable modem comprising:

a first media access controller associated with a first memory portion into which data is written for transmission upstream from the cable modem;

a second media access controller associated with a second memory portion into which data is written for transmission upstream from the cable modem;

a first transmitter coupled with the first media access controller;

a second transmitter coupled with the second media access controller; and

a processor configured to configure the first transmitter to transmit data over a first upstream channel, configure the second transmitter to transmit data over a second upstream channel that differs from the first upstream channel if the second upstream channel is available, initiate transmission of a first data portion over the first upstream channel by writing to the first memory portion of the first media access controller and initiate transmission of a second data portion over the second upstream channel by writing to the second memory portion of the second media access controller.

36. A computer readable medium containing programming instruction for transmitting data from a cable modem within a cable television plant, the computer readable medium comprising:

computer readable code for transmitting a first portion of the upstream data on a first upstream channel from the cable modem; and

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computer readable code for transmitting a second portion of the upstream data on a second upstream channel from the cable modem, the second upstream channel differing from the first upstream channel.

37. A computer readable medium containing programming instructions for transmitting upstream data from a cable modem over multiple upstream channels within a cable television plant, the computer readable medium comprising:

computer readable code for configuring the cable modem to transmit over a first upstream channel if the first upstream channel is represented by information within a downstream channel; and

computer readable code for configuring the cable modem to transmit over a second upstream channel if the second upstream channel is represented by information within the downstream channel and if the second upstream channel differs from the first upstream channel.